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ABSTRACT

Different feedback formats were utilized on a series of computer assisted lessons on physical diagnosis for second year medical students. Each lesson in the series is broken down into four or five major sections; in each section, the student is presented with a list of possible actions to be taken. On each item, three forms of feedback, two of which are generated by the computer, are received. The first type of feedback is ranking the items on the list in the order in which the student would do them; this rating is then compared with that of the author and his peers. A correlation coefficient is obtained for each comparison. The second feedback component is that of the "good/bad" judgment. The student is asked on each entry in the list whether he feels a particular action is appropriate; his response is immediately compared with the author's and he is informed of the result. The final and more personalized form of feedback is a short essay in which the student gives his opinion on the action. These essays are then stored, and later printed out for the instructor to read, review, and comment on. Although very limited student feedback was available, generally the students liked the instructional design feedback features. (VT)

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TYPES OF STUDENT FEEDBACK IN PHYSICAL DIAGNOSIS LESSONS

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Types of Student Feedback in Physical Diagnosis Lessons

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ABSTRACT

Feedback to the student is a crucial part of any form of instruction. Different feedback formats were utilized on a series of computer assisted lessons on physical diagnosis for the second year medical students. All of these lessons were developed on the PLATO system.

Each lesson in the series is broken down into four to five major sections. In each section the student is presented with a list of actions that can be taken. On each item three forms of feedback, two of which are generated by the computer, are received.

The first type of feedback is ranking the items on the list in the order in which the student would do them. On completion of the section, the student's ranking is compared against that of the author's and his peers'. Using the Spearman Rank-Correlation Coefficient, a numerical value is obtained for each comparison.

The second feedback component in the series is that of the "good/bad" judgement. The student is asked on each entry in the list whether or not he feels a particular action is appropriate. His response is then immediately compared against the author's, and he is informed of the result. Running totals are kept, and are always presented to the student. The student can also see how the other students fared on that particular question.

The final and more personalized form of feedback is the short essay. In this case the student is asked for his opinion, in his own words, on the action. These essays are then stored, and later printed out for the class instructor to read, review, and comment on and hand back in class. In this way, the class instructor is kept aware of the student's progress.

INTRODUCTION

During the clinical phase of medical education a great deal of emphasis is placed on "decision making." The value of this skill can be clearly seen in the management of the patient. No diagnosis can be made and no treatment administered without traversing the proper decision path. The decisions that the physician has to make arise in many different areas from what questions to ask in a history taking session (maintaining a good rapport with the patient is essential), to which procedures to be performed in a physical examination. This also becomes obvious when setting up the patient's treatment plan.

Educators advocate and employ a variety of teaching/learning techniques teaching the art of decision making and patient management. These techniques include role playing, simulated patient encounters with actors, videotaped analysis, audiotaped interviews, patient management problems on paper and computer simulations. With the exception of computer simulations, the rest of the techniques have been used in medical schools for a number of years.

This paper attempts to highlight the use of computer technology, especially PLATO, in the development of clinical simulations on history taking and patient management. Specifically, unique features of the instructional design i.e. interactive process, quantitative and qualitative feedback and integration of simulations within a course will be elaborated on.

Physical diagnosis is taught during the sophomore year at the University of Illinois. During this course, clinical teaching encompasses such activities as pre-clinical experiences on simulated models, student practice on each other and bedside teaching. In addition to these, at the Rockford School of Medicine of the University of Illinois students are given management problems involving physical diagnosis. Prior to developing of these problems on PLATO, physical diagnosis students were given a nine workbook series to complete and turn in at prearranged times during the quarter. The workbooks were broken up in sections with a number of items in each section. Students were asked to evaluate each item in essay form explaining the reasoning behind their evaluation.

Generally, the students described the workbook experience as inefficient and very restrictive in obtaining feedback. Thus, the course instructor wanted to explore other instructional options in which students can assume active roles as the problem solvers and are provided with instant feedback on their ability to master medical content. Such an alternate method is feasible on PLATO. Therefore, the nine clinical problem workbooks were adopted to a simulation format in the form of PLATO lessons (programs).

DESCRIPTION OF LESSON

The nine lessons that compose the series are similar in structure. A lesson is broken into logical categories with a list of choices presented to the student. A typical lesson contains four sections: history, physical examination, assessment and treatment. The list in a typical section will have four to twelve questions, actions or other choices from which the student can pick. This type of format leaves the pace and direction of the lesson in the hands of the student allowing him to use the lesson to his satisfaction. In this way, if the student wants to review some particular problem solving technique, he can go back to the section in question and look at it before going further.

Following a student's progress through a lesson will give a better idea of the structure. Upon entry, the student first sees some introductory comments and instructions. He is then given a short statement of the patient's problem along with a main index to choices in the workup of the patient. (Figure 1) In some cases, the index entries are only listed if certain criteria have been met, such as completion of prerequisite sections.

Once the student has chosen which phase of the workup he wishes to attempt, he is presented with the list of actions. The entries in the list are randomly ordered for every student. The student's task in the lesson thus is as follows:

1. The student is required to "rank" the questions/actions in the order in which he would ask/do them as an exercise in comparative clinical judgment. (Figure 2)

2. After making his choice, the student is then asked his opinion on the appropriateness of the question/action. This is done in the form of a binomial choice, such as in answering yes or no to the question "Do you think that this item is a good or a bad one?"

3. Completing the simple one word response, the student is then provided with a place where he can elaborate and expand on his judgment.

4. After finishing the essay, the student is then shown the patient reaction to his action. In the case of a history-taking question, it would be the patient's response. In a physical exam or lab test, it would be data obtained from the patient or test. In all other cases it would be the instructor's one word judgment of the appropriateness of a management decision probability of a diagnosis. Also presented is the instructor's comment about the significance of the item.

5. After reading the instructor's comment about the item, the student returns to the list of entries again.

This five step process is repeated until all the items in the section are "ranked", or if the student so desires he may interrupt the process and return to the main index, where he can choose to start another section. It should be noted that sections are not considered completed until all the entries are "ranked", though there is no penalty incurred if the student decides to go to a different section. Finally the lesson is considered complete only when all the sections are finished.

METHOD AND RESULTS

In clinical medicine, and especially in physical diagnosis, strong emphasis is placed on judgment: by asking questions and observing physical characteristics the doctor is expected to make the proper patient care decisions. In these simulations, the students are asked to make the very same type of decisions and judgments. "Decision-making" and "judgment" are extremely hard to teach in a large classroom environment because each student is at a different level. Individual teaching is the optimal solution, but obviously, it is also an infeasible one. This is where the lessons come in. They offer the individual tutoring that each student needs but do not impinge on other students' progress allowing each individual to work at his own speed.

Feedback is an integral part of any teaching method, providing the students with information. This information can come in many forms, from the simple "right" and "wrong" statements to an elaborate evaluation algorythm. The lesson's feedback system is made up of three different components, each returning a unique piece of information. Thus the student is provided with a comprehensive report on his learning process.

The first element of feedback is the most basic and the one the most often seen by the student: the "right/wrong" return on the student's binomial act of judgment. It is determined by doing a simple comparison of the student's response against that of the instructor. The student receives this feedback in two ways: first, a running total of the number of items answered correctly by the student and the number answered incorrectly. Thus the student is constantly aware of this ratio of correct to incorrect judgments and how it changes. The second way in which feedback on the bionomial judgment is given is the percentage of students answering the question correctly. The student is shown how many students attempted the question and what percent of these agreed with the instructor's answer.

This data is presented to the students along with the instructor's assessment on the worth of the proposed action.

The next component of the feedback system is the most elaborate, as it provides an evaluation of the item rankings done by the individual, the instructor, and class as a whole. On completion of each section, the student is shown three correlation coefficients: student-instructor rankings, student-class rankings, and class-instructor rankings. The student-class computation is made from the cumulative group rankings based on all previous students using the lesson. The same group is used for computing the class-instructor coefficient. The Spearman Rank-Correlation Coefficient (1) was used.

From the value of the correlation which is explained to the student when he sees it at the conclusion of every section, the student obtains information about the validity of his comparative judgment based on the judgment of the instructor and the judgment of the group. Since ranking is quite a subjective activity, no significance for this measure can be claimed. It is interesting to note, however, that in general high correlations were obtained between the instructor and the class from the beginning of the series (Table 1). However, no definite pattern was observed on some of the problems completed by the students. More complete data will be available by the time of the presentation of the paper.

The third type of feedback is a carry-over from the workbook format: the essays. Each student is required to write an essay explaining his "good/bad" judgment on each item. These essays are written and stored on-line (in a special PLATO file called a notes-file), printed out weekly and then sent to the instructor for his review. After writing his comments on the printouts, the instructor hands them back in class. Thus the student is provided with a hard-copy of his performance. Alternately, the instructor could respond on-line to each essay and then receive a hard copy. In this instance, due to the instructor's heavy schedule and distance from a terminal, this option was not utilized.

Essay type student response forces students to articulate their position. This reduces "cueing effect" which is quite common with simulation designs with pre-formulated answer responses.(2)

CONCLUSION

As of this writing, the first group of students to use the lesson series has not been completed; therefore, a very limited student feedback was available for reporting. Generally, the students liked the instructional design features such as instant feedback, ability to

express individual responses in the essay and the overall ranking with the instructor.

In addition, students have furnished very insightful comments to improve the design of the existing lessons. For example, in the area of instructor feedback, students were having difficulty in understanding the overall logic behind the instructor's position on ranking certain items.

The students claimed that if they followed the logic of the instructor's opinion they would receive low coefficients. Also, if they did well on the "good/bad" judgment, their coefficients would still be low. One student expressed it this way: "How do you rank one bad procedure over another bad procedure?" This problem will be addressed carefully after the class has finished most of these lessons.

It should be pointed out that even though group and instructor rankings, correlations, numbers of right and wrong answers, percentage of students answering each question correctly, and instructor's assessment of each question were all constantly available during the course of the entire program, students were dissatisfied with the time lag between their completion of the essays and the return of the essays in class.

There was also a problem of logistics in that the fifty students are expected to share two terminals. More terminals are being added to alleviate the problem of scheduling.

REFERENCES

(1) Glass, Gene V. and Julian C. Stanley, Statistical Methods in Education and Psychology, Prentice-Hall, Inc. 1970.

(2) McGuire, Christine, Solomon, Lawrence and Bashook, Phillip, Construction and Use of Written Simulation, The Psychological Corporation, 1976.

SECTION TOPICS

LESSONS IN ORDER OF COMPLETION	INITIAL OPTIONS	HISTORY	PHYSICAL EXAM	ASSESSMENT	TREATMENT
SORE THROAT	-1.ØØØ	Ø.571	Ø.964	Ø.8ØØ	Ø.721
EAR INFECTION	1.ØØØ	Ø.8Ø6	Ø.257	Ø.5ØØ	Ø.767
INDIGESTION	-----	Ø.418	Ø.458	1.ØØØ	Ø.714
COUGH	-----	Ø.538	Ø.758	Ø.8ØØ	Ø.15Ø
STOMACH TROUBLE	-----	Ø.531	Ø.8ØØ	Ø.9ØØ	Ø.698

Table I
Class - Instructor Correlation Coefficients Indicating Amount of Agreement in Ranking of Choices in Physical Diagnosis

THE PROBLEM

The patient is an eight-year-old female who presents with fever to 104, sore throat, and cough for three days. You are a student physician, working in a small midwestern ambulatory care facility who has been assigned to this family. When you enter the examining room, you have not met the patient or her mother.

Choose the number of the section you wish to do.

1. Initial statements
2. History
3. Physical
4. Assessment
5. Treatment

>

Press SHIFT-BACK to return to this index
* indicates you have started that section
+ indicates you have finished that section
[Rankings are shown in finished sections]

Figure 1.

Typical "problem statement" and "section index" for a Physical Diagnosis lesson

a. Inquire about medication, including aspirin

b. "Has the child ever had rheumatic fever?"

c. Ask if there have been any constitional symptoms.

d. Ask if the cough has been productive.

e. "You don't feel too good today, do you?"

f. Ask about previous upper respiratory infection.

g. Mildly chastise the mother for waiting 3 days before bringing in the child.

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Press HELP for instructions or SHIFT-BACK for the index

Figure 2

Typical Randomized Item List in One Section of a Physical Diagnosis Lesson. Students Must Rank the Items, Choosing the Best Ones First

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